CHEMICAL DETECTION ON MOBILE AND ARMORED VEHICLES (U)

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ABSTRACT (U)

(U) The use of chemical warfare (CW) agents continues to be a viable threat to U.S. Forces around the world. Given the increasing peacekeeping nature of the U.S. Forces, effective countermeasures to CW agents are necessary. Within the last few months the U.S. Army has taken delivery of a new chemical agent detector, the M22 Automatic Chemical Agent Alarm (ACADA). This is a major advance in the equipping of the U.S. Army's mounted force to face this continuing threat.

(U) The ACADA is the most advanced chemical warfare detector to be fielded by the U.S. Armed Forces. The ACADA detects the most common nerve and blister agents and can be programmed to address other agents. The system is designed to be point detector installed in vehicles, used by the infantry and deployed around fixed sites as a perimeter defense system.

(U) The ACADA is a rugged and self-contained unit, which can provide early warning of gas attack. This warning can be given by a local or a remote audio/visual alarm. The ACADA system has been developed complete with vehicle mount. This can provide protection for the detector in the harshest vehicle environment and facilitate the use of the vehicle electrical supply to power the unit. The system is scheduled to be installed on the FOX, M1A2 Bradley, HMMWV and the M113.

(U) Within the presentation, the ACADA Program Team will briefly review the ACADA test program, detail the performance of the unit, give details of the current vehicle programs and describe the support and training available from the program office.

(U) The ACADA was developed by a commercial company, Graseby Dynamics Limited, working closely with the U.S. Army Soldier and Biological Chemical Command (SBCCOM) at Aberdeen Proving Ground, Maryland.

(U) The use of Chemical Warfare agents continues to be a viable threat to U.S. Forces. In an interview for the United States Navy Surface Warfare Magazine, Major General Wooten, Commandant of the U.S. Army Chemical School stated “The chemical/biological threat is real, more so than the nuclear threat right now. Before the demise of the Soviet Union, we believed the chemical/biological threat was contained. But when “the wall” crumbled, there was no more central control; chemical/biological weapons and weapon delivery systems proliferated. Intelligence estimates 25-27 countries have either chemical or biological weapons.” (ref. 1) Chemical Agents have been called “poor man’s nuclear weapon”. The manufacture of chemical warfare agents in small quantities by terrorists is an ongoing threat but the manufacture and use of military quantities of chemical warfare agents for delivery against U.S. Forces during military missions is always a potential. The delivery of chemical weapons against our ground and mechanized forces could cause disruption of communications and a degradation of command and control. There are numerous defense strategies for countering these threats and the newest tool in ameliorating the tactical effects of chemical agents is the M22 Automatic Chemical Agent Alarm, ACADA (Slide 1). The M22 ACADA is the Joint Services most advanced chemical agent detector. It is a point detector which is capable of quickly warning our troops that a chemical attack has occurred or that our forces have traversed a chemically contaminated area. Chemical agents are colorless and in many cases odorless chemicals, which at very low concentration, can cause incapacitation and lethal effects on personnel (Slide 2). With sufficient warning, military personnel can take protective measures to reduce the chances of inhaling these chemical warfare agents, thereby preventing or reducing casualties (Slide 3). The M22 ACADA, when employed properly, will provide this warning capability. The M22 simultaneously senses vapors of Nerve and Blister agents and provides an alarm. It is programmable for other threat agents. The detector is highly resistive to interferences. The M22 system consists of the M88 detector, transit case, removable battery pack and M42 remote alarm unit. Auxiliary equipment includes the M28 power supply and M281 vehicle mount with an M42 mounting bracket
(Slide 4).

(U) M22 is designed for 3 operational roles. These roles include area warning, monitoring collective protective equipment (CPE) and operation on and in vehicles. In the area warning role, the M22 is employed up to 400 meters upwind and is operated by a battery pack (Slide 5). The hard wired M42 alarm unit is emplaced with the troops to be alerted. Once operational, set-up and break-down times are typically a few minutes, making the system highly mobile for changing tactical situations. In the CPE monitoring role (Slide 6) the M88 detector is used with the M28 power supply to allow long term monitoring of the air. This operational role will indicate if the “clean” environment has been breached by incoming contaminated personnel or equipment, or if the chemical filters have failed.

(U) In the vehicular role (Slide 7) the M88 detector is used with the M281 vehicle mount and powered from vehicle power. In this application the M88 detector can be installed at an appropriate location on the exterior or interior of the vehicle. Both applications require the M281 vehicle mount which provides vibration and shock isolation for the detector. The M42 is connected to the M88 alarm and located near crew members to provide an audible and visual alarm. The M88 is the detector used with the Multi-Purpose Integrated Chemical Agent Alarm (MICAD) system. The MICAD system is used for communication to the immediate crew and surrounding command and control units that a chemical agent has been detected in or around a particular vehicle. The M88 detector is easily removed from the M281 vehicle mount to allow for area warning around the vehicle.

(U) The M22 system is the most extensively tested chemical detector fielded to U.S. Forces (Slide 8). The 2 year test program included all military environmental and intended operational roles. Test conditions included operation at temperature extremes of –30 degrees Centigrade to +55 degrees Centigrade, rain, dust, salt spray and electro-magnetic interference including high altitude electro-magnetic pulse. Extensive vehicular tests (Slide 9) were conducted at the Test and Evaluation Command test sites in Alaska, Panama, Yuma, and Aberdeen. The detectors were mounted on the exterior of the vehicles to demonstrate reliability and survivability. In the Arctic, the Small Unit Support Vehicle (SUSV) and High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) were tested at temperatures down to -45 degrees Centigrade and were driven a total of 200 vehicular miles. At the Tropic Test Center, the M22 was mounted on the HMMWV and operated in driving rain and in tropic conditions for a total of 1,182 vehicular miles. At the Desert Test Center, the M22 was mounted on the M113 Armored Personnel Carrier (APC) and operated in dusty conditions and at temperatures up to 50 degrees Centigrade. At this location, a total of 2,760 vehicular miles were accumulated. At the Aberdeen Test Center (ATC), testing consisted of the M22 being mounted on the outside of the M113 APC and at the center console of the HMMWV. Both vehicles accumulated a total of 10,000 vehicular miles while being driven over the Perryman Cross-Country vehicle qualification courses. In all cases, the M22 and its vehicle mount operated successfully and without false alarm. An additional test was conducted (Slide 10) at ATC to qualify the M22 for attack vehicles. The M22 was mounted both inside and outside the M1A1 Main Abrams Battle Tank using the vehicle mount. The M1A1 cannon was fired to determine if the blast, shock and combustion effluents would effect the operation of the M22. The M22 operated successfully throughout the test.

(U) The M22 is rugged, not prone to interferences and is very sensitive to chemical agents. Its application on vehicles is the next step for providing our mechanized forces with the warning and information essential to protect the crew and to avoid contamination of their equipment. Currently, the M22 (Slide 11) is being installed in all M93A1 Nuclear Biological Chemical Reconnaissance Systems (FOX vehicles) and the M22 is a requirement on the Bradley Command Control Vehicle (C2V), the Advanced Amphibious Assault Vehicle (AAAV) and Light NBC Recon. The M22 can be applied to many types of platforms including the M113, HMMWV, Crusader, Paladin, Future Scout Vehicle, SUSV, M2 Bradley, and M1 Abrams. Applications on other vehicles are also viable.

(U) Graseby, the developer of the GID 3 (Slide 12) (which was designated the M22 by U.S. Forces) has fielded the detector on vehicles from several countries including Canada, United Kingdom, and Kuwait. The use of vehicles as mobile platforms for detecting a chemical threat will require development of doctrine but has the potential to provide warning to a mechanized company independent of ground troops. At a minimum, the M22 detector mounted on the vehicles, will provide the crew with a level of warning to protect both themselves and their equipment or to engage collective protective equipment, if available.

(U) The ACADA team is dedicated to product support and we have several (Slide 13) publications available or in development to assist operators and users in the deployment and operation of the M22. These include technical manuals, bulletins, a CD ROM, and an operator's video.

(U) For more information (Slide 14) on the ACADA program, contact either myself or Mary Beth Morris. For technical assistance, contact Graseby representatives Mr. Bloomfield or Mr. Langford.

Reference:

1. Surface Warfare Magazine, November/December 1996, "The Battle of NBC", p. 16 (U).